

ART. XVI.—*The Anatomy of Megascolides Australis.*

By PROFESSOR W. BALDWIN SPENCER.

[Received October 6, read November 10, 1887.]

The following is an abstract of the full paper which, with illustrations, is in course of publication as a separate monograph. Since it was written and read before the Society, a short account of the macroscopic anatomy of the same worm has been published in the Journal of the Linnean Society of New South Wales by Mr. Fletcher, whose paper was read in September, one month before the reading of this paper. The papers were written quite independently of one another, and, as far as the macroscopic anatomy of this interesting worm is concerned, are in almost perfect accord.

Professor M'Coy's description in the *Prodromus of the Zoology of Victoria* (Decade 1, Pl. 7), contains the first account published of the worm, and deals merely with its external anatomy. In this description the worm is placed in the family *Lumbricidae*, and thus close to the common earth-worm, a mistake which would appear to have been due to the counting of the annuli as segments.

Mr. Fletcher does not seem to have recognised the worm from Professor M'Coy's description, and himself giving a perfectly correct one, placed it in his genus *Notoscolex*, containing several other species, so that in his recent paper the worm appears under the name of *N. Gippslandicus*.

The worm lives in deep burrows, principally by the sides of creeks in Gippsland. The burrow is devoid of "castings" at its mouth, is of about the diameter of $\frac{3}{4}$ to 1 inch, and contains a slimy fluid; but only in very rare cases any trace of leaves dragged into it. With care, the animal, whose presence can easily be recognised by a peculiar gurgling sound made when retreating through its burrow, can be dug out. It has been described as brittle, but though it easily tears, the word "brittle" is most inapplicable, as it stretches to a very great amount before even tearing. Its odour, as pointed out by Prof. M'Coy, is very characteristic, resembling somewhat that of creosote.

The body varies in length from three to six feet, or even longer, and contains upwards of 500 segments. Anteriorly, it is somewhat swollen and hard, due to the very strong septa internally. The anterior segments contain from two to four annuli, which are often incomplete and slightly irregular. The segment boundaries are clearly marked, and posteriorly to about the 18th segment each one shows in the median dorsal line a large "dorsal pore," through which, in contraction of the body, the cœlomic fluid is pressed out in little jets. In the middle and posterior regions of the body the septa are inserted into the body-wall somewhat anteriorly to the line bounding the segment externally. Segments 13 to 20 are usually of a dark purple colour, are provided with an especially strong development of nephridia, and have externally to the muscle layers a strongly-marked development of glands. Ventrally, a portion which, as described by Professor M'Coy, is evidently equivalent to the cingulum of other worms, is found on the 17th, 18th, and 19th segments, where it forms three white prominent ridges, in the middle one of which are the male apertures. The whole of this region is called clitellum by Mr. Fletcher.

The setæ are arranged in four pairs in each segment, but cannot be seen in front of the 13th segment.

The paired external openings of the receptacula seminis lie between the 8th and 9th and the 9th and 10th segments, the oviduct openings close to one another ventrally on the 14th segment, and the male on two small papillæ in the part of the cingulum on the 18th segment, and correspond in position to the internal two pairs of setæ, which here cannot be seen macroscopically. No nephridio-pores can be detected.

SEPTA.

The first clear septum bounds anteriorly the fifth segment. Posteriorly, as far as the 16th segment, the septa are very thick, strong, concave anteriorly, and bound to one another by numerous connecting strands of muscle. Behind this they become membraneous until the hinder end of the body is reached, where they become again more muscular and have very definite supporting strands, radiating from the walls of the alimentary canal. This strong anterior and posterior development gives the worm great power of rapid swelling of its body so as to become very tightly jammed

against the burrow walls, and renders it difficult to extract the worm from its hole. The posterior end especially seems to have a strong power of suction.

ALIMENTARY CANAL.

The mouth is overhung by the ridged prostomium, and leads into the strong muscular pharynx, extending back to the 5th segment.

There is a good development of salivary glands which microscopically appear to resemble nephridia in structure.

The 5th segment contains the short cesophagus and longer gizzard, then follows the long intestine which, in segments 12 to 18, contains a series of very vascular dilatations, and from the 19th runs backwards to the terminal anus. Its walls are very distinct, yellow-brown in colour, and consist internally of an epithelium of deep cylindrical cells, with large nuclei and nucleoli, external to these a layer of circular muscle fibres, then a series of longitudinal fibres, and then a layer of cells whose thin internal ends send processes between the longitudinal fibres, and perhaps deeper still whilst their external parts are filled with yellow-brown granules. The cells contain large nuclei, and are to be regarded simply as modified cells of the membrane lining the body cavity. There is no structure present representing the typhlosole.

NERVOUS SYSTEM.

This resembles that of the ordinary worm, save that the distinction into ganglia and connecting commissures is not so clearly marked. Sections show clearly its double nature, and the arrangement of the large ganglion cells on the ventral and lateral aspects, and of the fibres in a double longitudinal band dorsally and internally. Dorsally are three, and at times, even four, of the so-called giant-fibres present. Each one, however, is very distinctly *not* hollow, but has the form of a solid homogeneous rod, surrounded by a considerable amount of ensheathing connective tissue. Three pairs of lateral branches pass off in each segment, and in sections can be traced towards the surface till they spread out on the internal side of the circular muscles in the body-wall.

CIRCULATORY SYSTEM.

A dorsal and ventral vessel are present. Lateral vessels, or "hearts," connect the two in the 13th to 6th segments inclusive, and from the 14th segment forward a lateral vessel is present on each side, and a small supra-intestinal branch in each segment. Posteriorly there is no direct connection between the dorsal and ventral vessels, and the former gives off two pairs of branches in each segment to the walls of the alimentary canal, in which they come to lie just externally to the cylindrical epithelium.

Around the dorsal vessel posteriorly is a curious ensheathing structure which gives off more or less solid diverticula into the body cavity. These processes are filled with distinctly nucleated, somewhat granular, polygonal cells. The nature and function of this structure is as yet unknown. In each segment it opens into the cœlom close to the anterior septum.

NEPHRIDIA (OF TWO KINDS).

(1) Very numerous, and varying in number in different segments. They are especially numerous in the 13th to 20th segments, and are scattered irregularly over the body wall. Each consists of a much coiled duct which is clearly *intra-cellular*, and surrounded by connective tissue very rich in blood vessels. These nephridia have no internal openings. (2) A series of larger nephridia in the middle and posterior regions, one pair in each segment, with distinct ciliated funnels opening internally. *All the nephridia are connected with a network of ducts lying beneath the cœlomic epithelium, from which others pass off to open externally, so that there are many irregularly arranged nephridio-pores in each segment. There seems to be one main duct continuous from segment to segment on each side ventrally.*

REPRODUCTIVE ORGANS.

(1) *Female*.—Ovaries paired and attached by short stalks to the septum bounding anteriorly the 13th segment. The two ciliated rosettes are in the same segment, and the oviducts leading from them open externally on the 14th segment.

The Receptacula seminis are large, prominent, paired, sac-like structures in the 8th and 9th segments. A curious

muscular slip runs up each side of the sac, which opens by a very short stalk with a small indication of a cæcum. Distally, the sac tapers considerably.

(2) *Male*.—Testes, small paired bodies, very similar macroscopically to the ovaries in the 10th and 11th segments. A similar pair of bodies may be found often in the 12th segment. The ciliated external openings of the vasa deferentia are very clearly marked, but the ducts themselves can only be traced backwards in sections. The ducts are remarkable in that they never unite with one another, but run back in the body-wall parallel and close to each other till they reach, and separately enter, the duct leading from the prostate gland to the exterior. The prostate glands are largely developed in the 18th segments, and from them the paired ducts run down to open externally on the small papillæ.

The *vesiculæ seminales* vary in development in different specimens. They form white, solid, racemose bodies, in which the spermatozoa are seen in various stages of development. They may be found connected with the faces of the septa, in the 11th, 12th, 13th, and 14th segments, and can always be distinguished macroscopically from the testes and ovaries by the definite position and size of the latter.

ART. XVII.—*Description of some Hitherto Unknown
Australian Plants.*

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[Read December 12, 1887.]

ACACIA BAILEYANA.

Arborescent; branchlets prominently angular, somewhat furrowed, glabrous or beset with short spreading hairlets; leaves bi-pinnate, almost sessile or on very short stalks, glabrous or the main-rhachis bearing hairlets when young, as well as the branchlets and flower-stalks somewhat whitish from ceraceous bloom; pinnules usually in three or